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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,499	03/31/2004	Douglas C. Yoon		4896

7590 10/12/2006

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EXAMINER	
HO, ALLEN C	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/813,499	YOON ET AL.	
	Examiner	Art Unit	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,13 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,13 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the subject matter claimed in claim 4 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the subject matter claimed in claim 6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 1 is objected to because of the following informalities:

(1) Line 12, "the average patient" should be replaced by --an average patient--.

(2) Line 24, "said digital radiation sensor" should be replaced by --said at least one radiation detector".

Appropriate correction is required.

4. Claims 2-8, 10, and 12 are objected to because of the following informalities:

"A radiation sensor" should be replaced by --A digital radiation sensor--.

Appropriate correction is required.

5. Claim 9 is objected to because of the following informalities:

(1) Line 10, "the average patient" should be replaced by --an average patient--.

(2) Line 25, "said digital radiation sensor" should be replaced by --said at least one radiation detector".

Appropriate correction is required.

6. Claim 15 is objected to because of the following informalities:

Claim 15 depends on a canceled claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

> pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 4 recites "each pair of adjoining generally planar radiation detectors are flexibly joined so that the angle at which they are abut can be changed". The specification does not describe how the planar radiation detectors are flexibly joined.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites "the projected image on the surfaces of the radiation detectors includes at least two intersecting line segments." The meaning of this recitation is unclear.

11. Claim 6 recites the limitation "said radiation detectors". There is insufficient antecedent basis for this limitation in the claim.

12. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: means for changing the angle.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002).

With regard to claims 1 and 6, Schulze and d'Hoedt disclosed a digital radiation sensor that comprises: a housing containing at least one generally planar radiation detector (CCD) providing a digital imaging surface, the housing conforming to the anatomic curvatures of the human maxillary and mandibular arches of an average patient; and at least one radio-opaque fiduciary element (steel balls) of known shape, size, and location (Experimental set-up).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 2, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) as applied to claim 1 above, and further in view of Dorr (U. S. Patent No. 1,286,251).

With regard to claims 2 and 3, Schulze and d'Hoedt disclosed a digital radiation sensor as in claim 1. However, Schulze and d'Hoedt failed to disclose at least two generally planar digital radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous digital imaging surface.

Dorr disclosed a film pack (**14**) that comprises two planar portions abutting at a non-zero angle to form a faceted contiguous imaging surface to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth (page 2, column 1, lines 5-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a radiation sensor that comprises two planar digital radiation detectors abutting at a non-zero angle, since a person would be motivated to configured the radiation sensor to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth.

With regard to claim 5, Schulze and d'Hoedt and Dorr disclosed a digital radiation sensor as in claim 2, wherein the fiduciary element is a sphere (Schulze and d'Hoedt disclosed steel balls).

17. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) as applied to claim 1 above, and further in view of Nambu *et al.* (U. S. Patent No. 6,196,715 B1).

With regard to claim 7, Schulze and d'Hoedt disclosed a digital radiation sensor as in claim 1. However, Schulze and d'Hoedt failed to disclose at least one radio-opaque fiduciary element embedded on, in, or under the housing.

Nambu *et al.* disclosed a method that provides at least one radio-opaque fiduciary element (M) on the housing of a radiation detector (**14**) (column 30, lines 13-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to embed the at least one radio-opaque fiduciary element on or in the housing of the at least one radiation detector, since a person would be motivated to have a fixed spatial relationship between the at least one radio-opaque fiduciary element and the at least one radiation detector, which would simplify the analysis by removing some uncertainties in the analysis. Furthermore, having an *in situ* fiduciary element means that one is not required to provide additional structure to support it, thus reducing the overall complexity of the system.

18. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) as applied to claim 1 above, and further in view of Bratslavsky *et al.* (U. S. Patent No. 6,811,312 B2).

With regard to claim 8, Schulze and d'Hoedt disclosed a digital radiation sensor as in claim 1. However, Schulze and d'Hoedt failed to disclose a holding tab protruding from the housing.

Bratslavsky *et al.* disclosed a holding tab (**16**) that is removably attached to a digital radiation detector. Bratslavsky *et al.* taught that the radiation detector is properly positioned when the patient engages his or her teeth on the holding tab (column 1, lines 29-38).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a holding tab on the housing, since a person would be motivated to position the digital radiation detector relative to a patient's teeth.

19. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) in view of Dorr (U. S. Patent No. 1,286,251).

With regard to claims 9 and 10, Schulze and d'Hoedt disclosed a digital radiation sensor that comprises: a housing containing at least one generally planar radiation detector (CCD) providing a digital imaging surface, the housing conforming to the anatomic curvatures of the human maxillary and mandibular arches of an average patient; and at least one radio-opaque fiduciary element (steel balls) of known shape, size, and location (Experimental set-up).

However, Schulze and d'Hoedt failed to disclose at least two generally planar digital radiation detectors abutting at a non-zero angle to form a faceted, generally contiguous digital imaging surface.

Dorr disclosed a film pack (**14**) that comprises two planar portions abutting at a non-zero angle to form a faceted contiguous imaging surface to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth (page 2, column 1, lines 5-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a radiation sensor that comprises two planar digital radiation detectors abutting at a non-zero angle, since a person would be motivated to configured the radiation sensor to accommodate the anatomic curvature of the gum and hard palate anterior to the upper row of teeth.

20. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) and Dorr (U. S. Patent No. 1,286,251) as applied to claim 9 above, and further in view of Bratslavsky *et al.* (U. S. Patent No. 6,811,312 B2).

With regard to claim 12, Schulze and d'Hoedt and Dorr disclosed a radiation sensor as in claim 9. However, Schulze and d'Hoedt and Dorr failed to disclose a holding tab protruding from the housing.

Bratslavsky *et al.* disclosed a holding tab (**16**) that is removably attached to a digital radiation detector. Bratslavsky *et al.* taught that the radiation detector is properly positioned when the patient engages his or her teeth on the holding tab (column 1, lines 29-38).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a holding tab on the housing, since a person would be motivated to position the digital radiation detector relative to a patient's teeth.

21. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002).

With regard to claim 13, Schulze and d'Hoedt disclosed a method for correcting distortions in a radiation sensor used with digital radiography imaging system for intraoral placement in a mouth of a patient for producing radiographs of teeth and their anatomical support structures of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth (p. 37, column 1, lines 30-36), the method comprising the steps of: providing a housing containing at least one, generally planar, radiation detector (CCD image receptor) providing an imaging surface oriented toward a radiation source, the housing conforming to the anatomical curvatures of the of an average patient (p. 35, column 2, lines 18-26); placing at least

one radio-opaque fiduciary element (reference steel balls) of known shape, size, and location intermediate a radiation source (x-ray tube) and the surface of the at least one radiation detector and placed in a fixed, known spatial orientation to the sensor imaging plane (Table 1), the at least one fiduciary element casting a projected image on the at least one radiation detector when illuminated by the radiation source; exposing the at least one radiation detector and the at least one fiduciary element to the radiation source to project an image of the at least one fiduciary element and the teeth and supporting structures onto the surface of the at least one radiation detector; capturing and digitizing (with a personal computer) the data representing the projected image of the fiduciary element, teeth, and their anatomical supporting structures images of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth on the surface of the at least one radiation detector produced by the radiation detector (p. 35, column 2, lines 26-36); analyzing the digitized image data to determine the distortion of the projected fiduciary image onto the surface of the at least one radiation detector due to the non-perpendicularity of the radiation source with respect to the surface of the at least one radiation detectors from that of an ideal fiduciary image projected onto the surfaces of the at least one radiation detectors defined by exposure of the fiduciary element to a radiation source perpendicular to the surface of the at least one radiation detectors (p. 36-38).

However, although Schulze and d'Hoedt suggested correcting the distortion (p. 32, conclusions), Schulze and d'Hoedt failed to teach the steps of determining a corrective transformation that transforms the distorted projected fiduciary image to that of the ideal fiduciary image, and apply the corrective transformation to the remaining digitized image data in order to transform the distorted projected image of the teeth and their anatomical supporting

structures of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth to that of an ideal projected image of the teeth and their anatomical supporting structures of bone, periodontal ligaments and gingiva around the root and cervical region of the tooth.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine a corrective transformation that transforms the distorted projected fiduciary image to that of the ideal fiduciary image, and apply the corrective transformation to the remaining digitized image data, since a person would be motivated to obtain a correct analysis based on undistorted images.

22. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) as applied to claim 13 above, and further in view of Nambu *et al.* (U. S. Patent No. 6,196,715 B1).

With regard to claim 15, Schulze and d'Hoedt disclosed a method as in claim 13. However, Schulze and d'Hoedt failed to teach a step of embedding on, or placing in or under the housing at least one radio-opaque fiduciary element.

Nambu *et al.* disclosed a method that provides at least one radio-opaque fiduciary element (M) on the housing of a radiation detector (**14**) (column 30, lines 13-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to embed the at least one radio-opaque fiduciary element on or in the housing of the at least one radiation detector, since a person would be motivated to have a fixed spatial relationship between the at least one radio-opaque fiduciary element and the at least one radiation detector, which would simplify the analysis by removing some uncertainties in the

analysis. Furthermore, having an *in situ* fiduciary element means that one is not required to provide additional structure to support it, thus reducing the overall complexity of the system.

Response to Arguments

23. Applicant's arguments filed 26 September 2006 with respect to the drawings have been fully considered and are persuasive. The objection of the drawings has been withdrawn.

24. Applicant's arguments filed 26 September 2006 with respect to claims 9-11, 13, and 14 have been fully considered and are persuasive. The objections of claims 9-11, 13, and 14 have been withdrawn.

25. Applicant's arguments filed 26 September 2006 with respect to claims 1-8 have been fully considered and are persuasive. The rejection of claims 1-8 under 35 U.S.C. 112, second paragraph, has been withdrawn.

26. Applicant's arguments filed 26 September 2006 with respect to the rejection(s) of claim(s) 1-8 under 35 U.S.C. 103(a) as being unpatentable over Dorr (U. S. Patent No. 1,286,251) in view of Schuller *et al.* (U. S. Patent No. 4,941,164) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002).

27. Applicant's arguments filed 26 September 2006 with respect to the rejection(s) of claim(s) 9-11 under 35 U.S.C. 103(a) as being unpatentable over Schick (U. S. Patent No. 5,434,418) in view of Dorr (U. S. Patent No. 1,286,251) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration,

a new ground(s) of rejection is made in view of Schulze and d'Hoedt (Dentomaxillofacial Radiology 2002) and Dorr (U. S. Patent No. 1,286,251).

28. Applicant's arguments filed 26 September 2006 have been fully considered but they are not persuasive.

With regard to claim 13, the applicants argue that Schulze and d'Hoedt failed to disclose at least one radio-opaque fiduciary element placed in a fixed spatial relation to the imaging surface of the sensor because the at least one radio-opaque fiduciary element disclosed by Schulze and d'Hoedt is temporarily attached to an object. The examiner respectfully disagrees. There is no reason to interpret the phrase "fixed spatial relation" as anything permanent as the applicants seem to suggest. Schulze and d'Hoedt clearly disclosed at least one radio-opaque fiduciary element placed in a fixed spatial relation to the imaging surface of the sensor (Table 1). Therefore, the rejection is being maintained.

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(1) Pellegrini *et al.* (U. S. Patent No. 6,461,038 B2) disclosed a dental x-ray sensor holder.

(2) Tanaka (U. S. Patent No. 4,949,370) disclosed a dental x-ray irradiation indicating device.

(3) Kreider (U. S. Patent No. 2,240,336) disclsoed an anatomically conforming intraoral dental radiological sensor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Allen C. Ho

Allen C. Ho, Ph.D.
Primary Examiner
Art Unit 2882

06 October 2006